

New Technique to Diagnosis Mental Disorders

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Abstract

Quantitative electroencephalography (QEEG) is becoming an increasingly common method of diagnosing neurological disorders and, following the recommendations of The American Academy of Neurology (AAN) and the American Clinical Neurophysiology Society (ACNS), it can be used as a complementary method in the diagnosis of epilepsy, vascular diseases, dementia, and encephalopathy. However, few studies are confirming the importance of QEEG in the diagnosis of mental disorders and changes occurring as a result of therapy; hence, there is a need for analyses in this area. The aim of the study is analysis of the usefulness of QEEG in the diagnosis of people with generalized anxiety disorders. Our research takes the form of case studies. The paper presents an in-depth analysis of the QEEG results of five recently studied people with a psychiatric diagnosis: generalized anxiety disorder. The results show specific pattern amplitudes at C3 and C4. In all of the examined patients, two dependencies are repeated: low contribution of the sensorimotor rhythm (SMR) wave amplitudes and high beta2 wave amplitudes, higher or equal to the alpha amplitudes. The QEEG study provides important information about the specificity of brain waves of people with generalized anxiety disorder; therefore, it enables the preliminary and quick diagnosis of dysfunction. It is also possible to monitor changes due to QEEG, occurring as a result of psychotherapy, pharmacological therapy and EEG-biofeedback.

Keywords: Generalized anxiety disorder • Conditions • Diagnosis • QEEG

Introduction

We experience fear throughout our lives. It provides benefits, such as increasing our vigilance in a variety of challenging situations and so defending us against danger. It also calls for particular adaption measures. Unfortunately, persistent and severe anxiety can disrupt behaviour, "paralyse," and impair day-to-day functioning. Workplace pressures and challenging conditions can cause a variety of anxiety symptoms to manifest, including phobias, panic attacks, post-traumatic stress disorder, and generalised anxiety disorder (GAD). Anxiety is a subjective phenomena that causes a sense of threat; it has no clear cause and can apply to hypothetical situations where the sufferer imagines what might occur and fears events that are unjustified. In addition, unconscious variables frequently contribute to worry. People frequently feel helpless in the face of their own anxiety as a result. The approach to analysing objectively functioning variables depends on the individual predispositions of the analyst, which are largely influenced by the interaction of biological and psychosocial experiences of the analyst [1]. According to the most recent ICD-11 categorization, many anxiety symptom types were categorised under the umbrella term "anxiety and fear disorders" [2,3].

Numerous researchers' analyses suggest that these diseases are caused by the interaction of biological and psychosocial elements (such as the familial and educational environments, additional surroundings, connected crises, and traumatic events) [4–7].

Strong, persistent stressors have the potential to exacerbate anxiety. Unfortunately, as evidence suggests, the long-lasting coronavirus epidemic has also led to an increase in anxiety in many persons [8,9].

The neurophysiological underpinning of the association between the

emergence of severe anxiety symptoms that go undiagnosed and the declarative memory associated with the hippocampus and emotional memory associated with amygdala activity was discovered. It is also underlined the significance of biochemical imbalance in the body brought on by infections and vitamin B and C deficiencies. Both adults (approximately 20%) and children (between the ages of 5 and 18) are affected by this illness. GAD is twice as common in women as in males depending on gender [10]. Negative experiences might also lead to anxiety problems. Anxiety is frequently triggered by the emergence of specific conditions that make people think of a bad, stressful experience. Understanding the patient's personal experiences helps the patient maintain self-control, which may help to lower their anxiety. On the other side, behavioural change is required in order to effectively deal with challenges.

Anxiety disorder with the use of QEEG

People who experience these kinds of symptoms are treated with psychotherapy, frequently in conjunction with medicine, due to the numerous, overlapping drivers of anxiety disorders. According to therapeutic guidelines, benzodiazepines, such as alprazolam, are most frequently used only temporarily since they quickly alleviate the symptoms of anxiety. The patient's participation in this process appears to be impacted by the speed with which these medications take effect. It's critical that the patient not abandon treatment out of a sense of futility. Medication is required for both emergency situations and anxiety management. However, it is important to consider the significant danger of developing a benzodiazepine addiction. Here, the psychodynamic approach is often used, but cognitive-behavioral therapy (CBT) is becoming seen as the most efficient technique. According to the psychoanalytical perspective, inner conflicts that are unconscious in nature are what cause dread. Conversely, cognitive-behavioral therapy focuses on recognising and changing illogical or non-functional beliefs that lead to dread. Here, it's crucial to practise (among other things) self-control tactics for anxiety-triggering symptoms and imaginative exposure of anxiety triggers, as well as to concentrate on worrying control and the usage of tension-relieving relaxation techniques.

In order to reinforce healthy brain function through operant training, neuro feedback, also known as neuro therapy, provides real-time feedback from brain activity. Methods like QEEG and neuro feedback can be helpful in monitoring the success of therapy and the treatment of patients with this kind of dysfunction. It is a cheap, simple, and non-intrusive technique. Additionally, fast wave amplitudes should be up to 50% higher in a given dominant hemisphere, per

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the standards, and slow wave amplitudes-delta, theta, alpha, and SMR-should be higher in the non-dominant hemisphere. However, taking into account the contributions of alpha and SMR waves, a slight revision to these percentages can be made in accordance with neuro therapeutic practise. In particular, these waves have a tendency to grow when there is emotional strain, which may be caused by problems with subcortical inhibition. Increasing these waves in the range of alpha up to 16% and SMR up to 12% is the goal of neuro feedback training planning. The activity of beta1 and beta2 waves should then get the remaining 3% of these waves' contribution.

Results

The studied AD woman had a normal delta wave with amplitudes of 8.73 mV in C3 and 8.42 mV in C4. As long as it doesn't exceed 20%, the amplitude difference between the left and right hemispheres is also accurate. Theta, on the other hand, is normal but higher than delta with values of 9.62 mV in C3 and 9.53 mV in C4. We believe that the contributions made by theta amplitudes greater than delta amplitudes are inaccurate. The alpha amplitudes at C3-7.94 mV and C4-11.1 mV are more than the normal difference of 20%, which we regard to be an aberrant indicator; they also show that the limbic system is activated in the right hemisphere. Additionally, the theta amplitude is lower than the alpha amplitude, which also denotes abnormalities. The alpha amplitude is larger (above normal) in the right hemisphere than it is in the left (normal up to 10 mV). It is right since the SMR amplitudes in C3 are 5.75 mV and C4-6.62 mV, respectively, and there is a 20% amplitude difference. Low contributions of delta wave amplitudes compared to other waves are seen during examination of the AD patient. The alpha wave amplitudes exhibit a noticeable left-right imbalance. In both hemispheres, we also notice a very significant increase in the amplitudes of beta1 and beta2 waves, with beta2 exceeding the amplitudes of not only alpha but also theta and delta. The beta wave amplitudes in a model of calm activity should not be higher than 1/2 theta.

When compared to other waves, particularly the beta1 and beta2 wave amplitudes, the GG patient's examination reveals minimal contributions from the delta wave amplitudes. The beta1 wave amplitudes show left-right asymmetry and are higher in the left hemisphere. Additionally, we see that the beta1 and beta2 wave amplitudes line up with the alpha wave amplitudes. The amplitudes of beta waves shouldn't be greater than a half-theta in a tranquil psychophysical condition. Alpha and beta wave amplitudes that are equalised always signify the presence of worry and tension.

Low proportions of the delta wave amplitudes in comparison to the other waves, particularly the beta1 and beta2 wave amplitudes, are observed in the SK patient's evaluation. The beta1 and beta2 wave amplitudes exhibit clear left-right asymmetries, with a pronounced rise in the right hemisphere. Additionally, we see that the beta1 and beta2 wave amplitudes are abnormally higher than the alpha wave amplitudes.

The TD patient's examination reveals that all wave amplitudes have no effect. The beta1 and beta2 waves have a propensity to grow in amplitude, with a modest increase in the left hemisphere.

Low contributions of all wave amplitudes are observed during examination of a GP patient. Two primary anomalies are visible: an increase in theta wave amplitudes relative to delta wave amplitudes and an increase in beta2 amplitudes in both hemispheres, with a little increase in the left hemisphere.

Discussion

The findings of the patients and the generalised anxiety disorder diagnosis allow for the conclusion that they are comparable in some ways. On the other hand, we can discuss the unique characteristics of each person.

As a result, broad tendencies in the field of wave amplitudes can be identified in individuals with generalised anxiety disorder. In all cases, two connections are repeated: modest contributions of SMR wave amplitudes and high beta2 wave amplitudes, higher or equal to the alpha amplitudes, according to a comparison of the amplitudes in C3 and C4.

Conclusion

In conclusion, the results show that QEEG is a useful method for identifying the precise brain waves present in individuals with generalised anxiety disorder. However, this kind of diagnosis must be made in a larger sample of persons who have this kind of disease. Our analyses serve as a springboard for additional study. The results should be compared to those of individuals who exhibit anomalies in psychosocial functioning, which are based on neurological reasons.

A easy technique to find out if there are any anomalies is to diagnose the QEEG. Additionally, it enables one to learn some of the disease's mechanics.

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